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December 1960

JOINT PHOTOGRAPHIC INTELLIGENCE REPORT

METALLURGICAL COMBINE UNDER CONSTRUCTION

VERKHNYAYA SALDA, USSR

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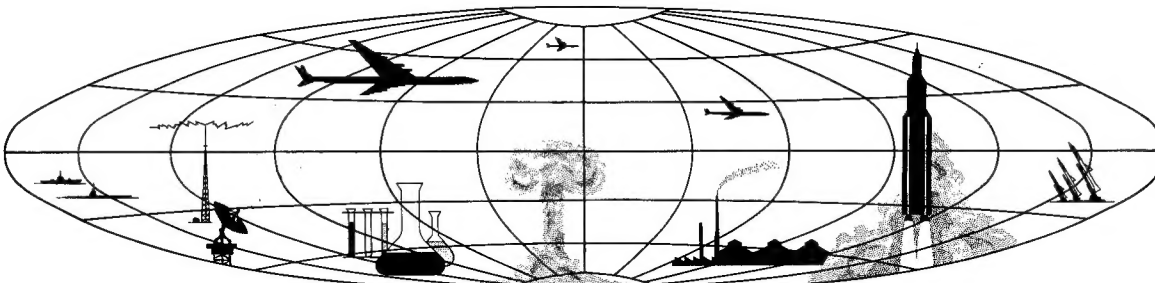
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**METALLURGICAL COMBINE
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PREFACE

This joint photographic intelligence report has been prepared by the Army, Navy, and Central Intelligence Agency in response to CIA requirement PIC/OSI/R-55/60. This requirement calls for a detailed study to include specific dimensions of the buildings under construction and an estimate of the electric power facilities present at the site. It is expected that the information presented in this report will aid the requesting office and the intelligence community as a whole in determining whether this construction project at Verkhnyaya Salda could be related to the production of special metals, such as zirconium, for use in the Soviet atomic energy program.

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SUMMARY

The large construction project on the north edge of Verkhnyaya Salda appears to be a significant metallurgical combine. It is composed chiefly of two basic areas - one for ore processing and metal extraction, the other for metal refining and fabrication. They are served by a common rail-spur system from the Nizhniy Tagil - Alapayevsk line.

Electric power is available in abundance from the north portion of the Ural power grid through the Verkhnyaya Salda substation. Installation of electric power equipment and changes in the substation are in progress concurrently with the building of the metallurgical combine.

The interim state of construction activity in both areas inhibits the identification of the specific product or products involved. However, the combine appears to be especially noteworthy because of its size -- approximately 10,000 by 3,000 feet -- and its stringent security precautions including fencing with guard towers.

As requested, special consideration was given to the possibility of zirconium production, but this now appears doubtful on the basis of a comparison with US plants.

Although there is no direct evidence that this combine will produce other metals for the Soviet atomic energy program, this is a possibility to be considered in the light of its location within a 145 nautical mile (nm) radius of three known atomic energy complexes.

Nor can the possibility of guided missile production, suggested by prior reports, be ruled out entirely at this time.

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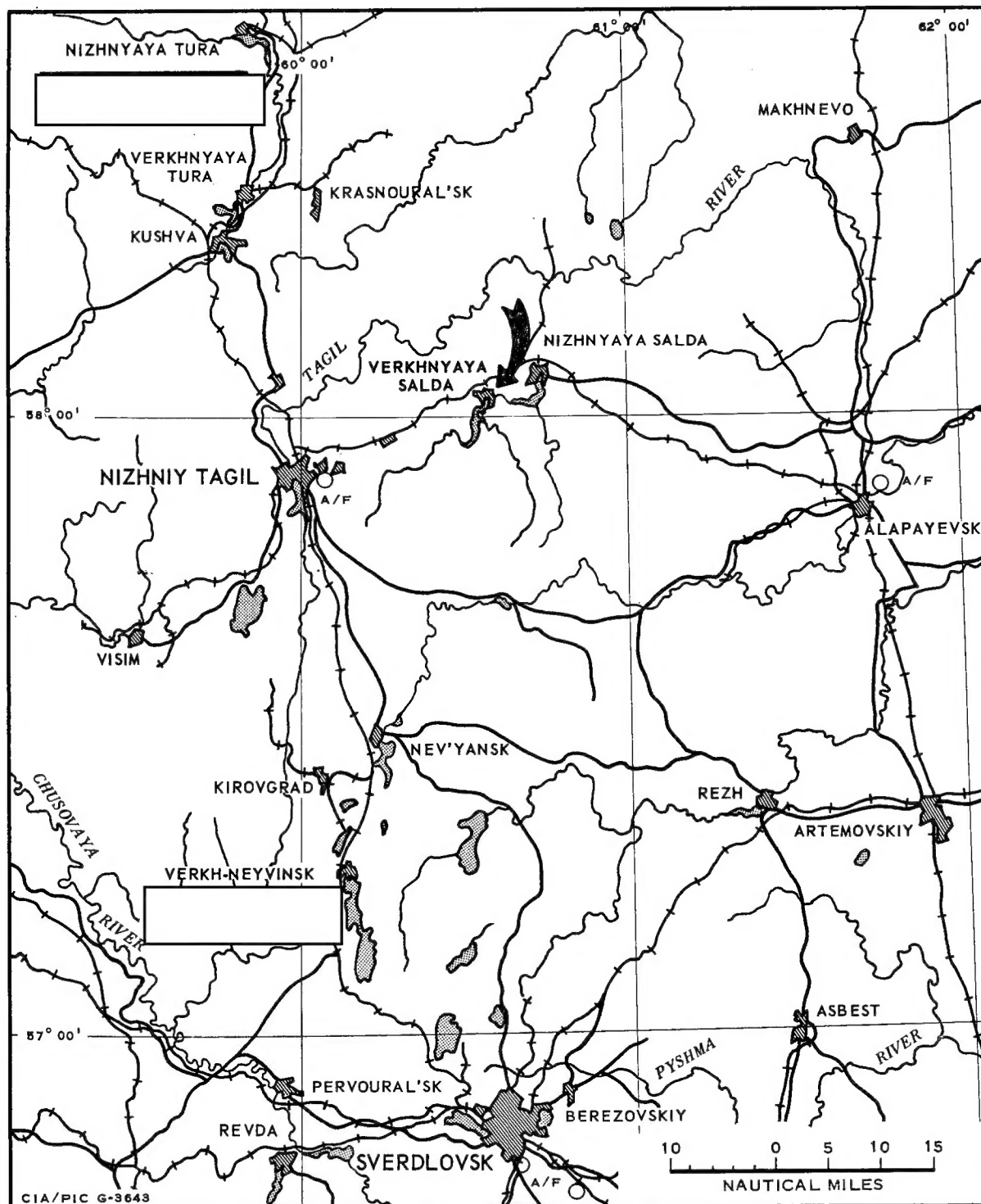


FIGURE 1. LOCAL ORIENTATION MAP

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INTRODUCTION

Excellent quality photography of [] reveals for the first time the presence of a large metallurgical combine under construction at the north edge of Verkhnyaya Salda. Verkhnyaya Salda is situated just east of the Middle Ural Mountains, 70 nm north of Sverdlovsk.

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Construction activity at the combine covers an area approximately 10,000 by 3,000 feet at 58-04N 60-33E. It lies to the north and northwest of Aircraft Parts Plant 95 []. Besides the closeness of the two sites, there is no known information as to how the combine might be related to Plant 95.

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A search of available collateral materials has failed to disclose any definitive information concerning this metallurgical combine or any large construction project at Verkhnyaya Salda. And yet, from the photography, it is evident that this is an activity of considerable significance.

The enormous size of this project combined with the stringent security precautions visible here are characteristics not common to most conventional industrial complexes. Furthermore, it should be noted that there are at least three atomic energy complexes in the general vicinity of Verkhnyaya Salda. They are at the following locations:

Nizhnyaya Tura, 42 nm NNW of Verkhnyaya Salda;
Verkh-Neyvinsk, 48 nm SSW of Verkhnyaya Salda;
Kyshtym, 145 nm S of Verkhnyaya Salda.

Rail service is available between Verkhnyaya Salda and all three of these complexes.

On the other hand, two prior reports 1/, 2/ have introduced the possibility of guided missile production as the function of this combine. There is insufficient evidence to confirm or deny this possibility at the present time.

The specific product or products of the metallurgical combine at Verkhnyaya Salda therefore cannot be ascertained at the stage of construction viewed on the photography, but the individual components have been

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isolated and measured, and are illustrated in this report. The installation contains ore-handling and processing facilities, metal-extraction and fabrication facilities, and numerous support activities in varying phases of construction.

SITE LAYOUT

The metallurgical combine consists of two large secured installations, areas A and B joined by an area which furnishes transportation, utilities, and logistical support to areas A and B.

The location of this combine at the north edge of Verkhnyaya Salda is illustrated by Figure 2. Area A lies approximately 5,000 feet west-north-west of Aircraft Parts Plant 95 while Area B is about 3,500 feet north of this plant. In addition to these areas, where construction is well along, there are several large new clearings visible near the combine. These clearings are probably for future housing for workers at the combine.

The basic features of the combine and its related facilities are depicted in Figure 3. In the west portion of the combine is Area A, a rectangular fenced area with its huge fabrication plant under construction. Area B in the east portion is an almost-square, fenced area. It includes an ore-processing plant, a steam plant, a concrete batch plant, and five large processing buildings, four of which are in the very early stages of construction.

Between areas A and B there is a network of connecting rail spurs, improved and unimproved roads, and a steam pipeline under construction. The rail network emerges from a single spur of the Nizhniy Tagil - Alapayevsk rail line (see Figure 3). All of the steam pipelines will eventually be connected in one system served by the steam plant in Area B.

Construction materials of all types are stored in the open and in warehouses along the rail spurs between areas A and B. Approximately 950 feet east of Area A there is a large overhead traveling crane for

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handling heavy structural members. Nearby is a small plant for processing construction materials.

South of Area B there are a number of facilities, most of which probably existed long before construction was started on the metallurgical combine. They include two fenced labor camps, multifamily housing units, smaller dwellings with adjoining garden plots, an administrative area, and a lumber yard. Although these facilities appear to be old and have probably existed chiefly for Plant 95, they might be utilized by the new combine, particularly during construction phases.

Additional temporary housing exists in the form of a tent camp located northeast of Area A. It includes approximately 70 tents, probably used by construction workers or security troops.

ELECTRIC POWER

Electric power within the Verkhnyaya Salda complex is furnished through a substation located approximately one mile east-southeast of Area A and one half mile south-southwest of Area B. The complex is served by 110-kilovolt (kv) circuits from the north portion of the Ural power grid (Uralenergo). Power is transmitted into the substation by a two-circuit 110-kv power line from Nizhniy Tagil supported on Leningrad steel lattice towers, each with three crossarms. Both circuits appear to be in service.

The substation itself is fenced and covers an area approximately 460 by 440 feet. It contains a 110-kv switching yard, a probable 35-kv switching yard, a control and low-voltage switching building, three probable 110/35-kv transformers, and a probable 110/10- or 6-kv transformer.

The 110-kv switching yard contains seven switching positions with switches and circuit breakers installed, or in the process of being installed. At the northwest end of the 110-kv yard, there is space for one or possibly two additional switching positions. An excavation for supporting foundations is visible for one of these positions.

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FIGURE 2. NORTH EDGE OF VERKHNYAYA SALDA, USSR. Construction

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activity extends over an area almost 2 miles long.

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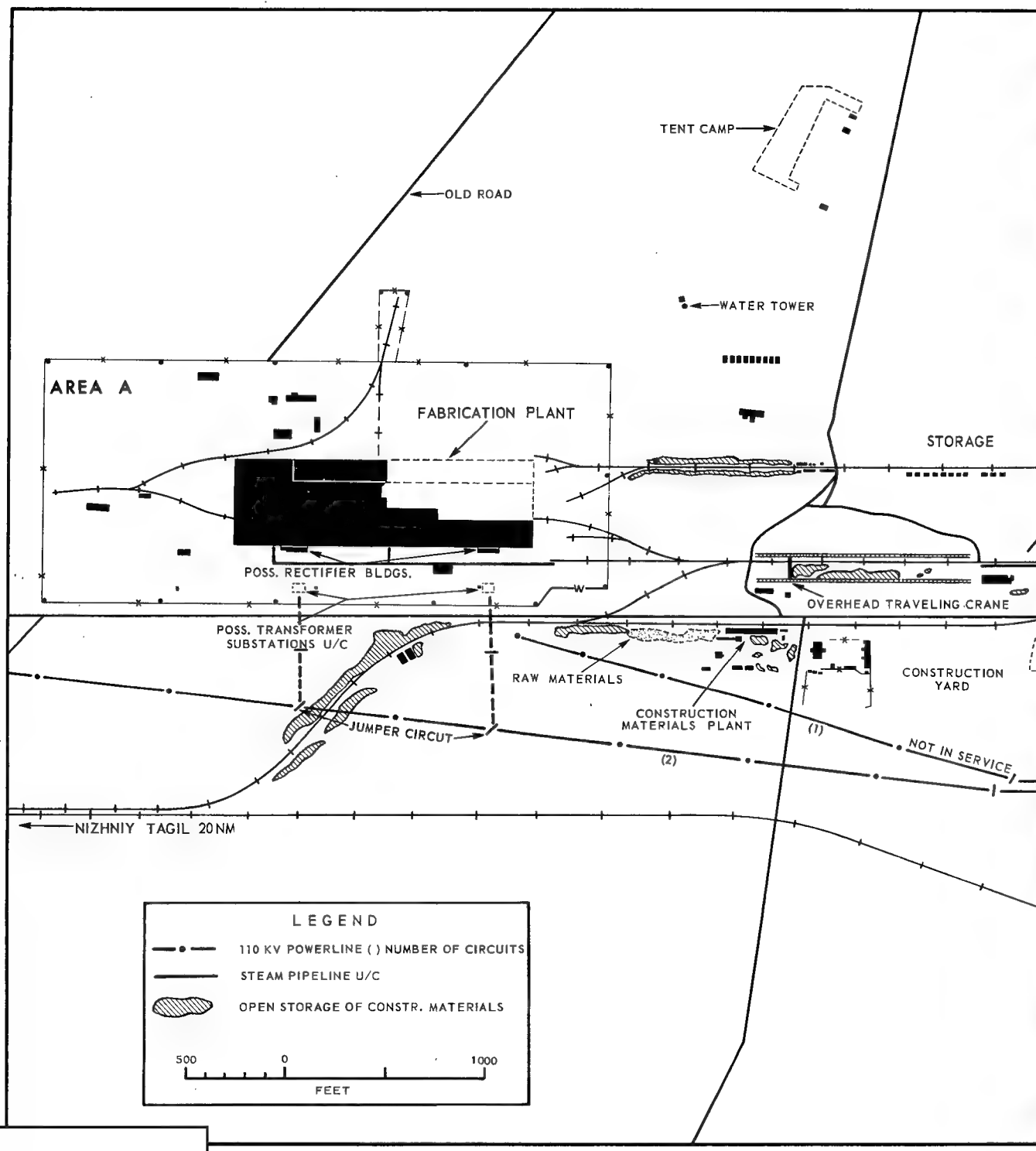
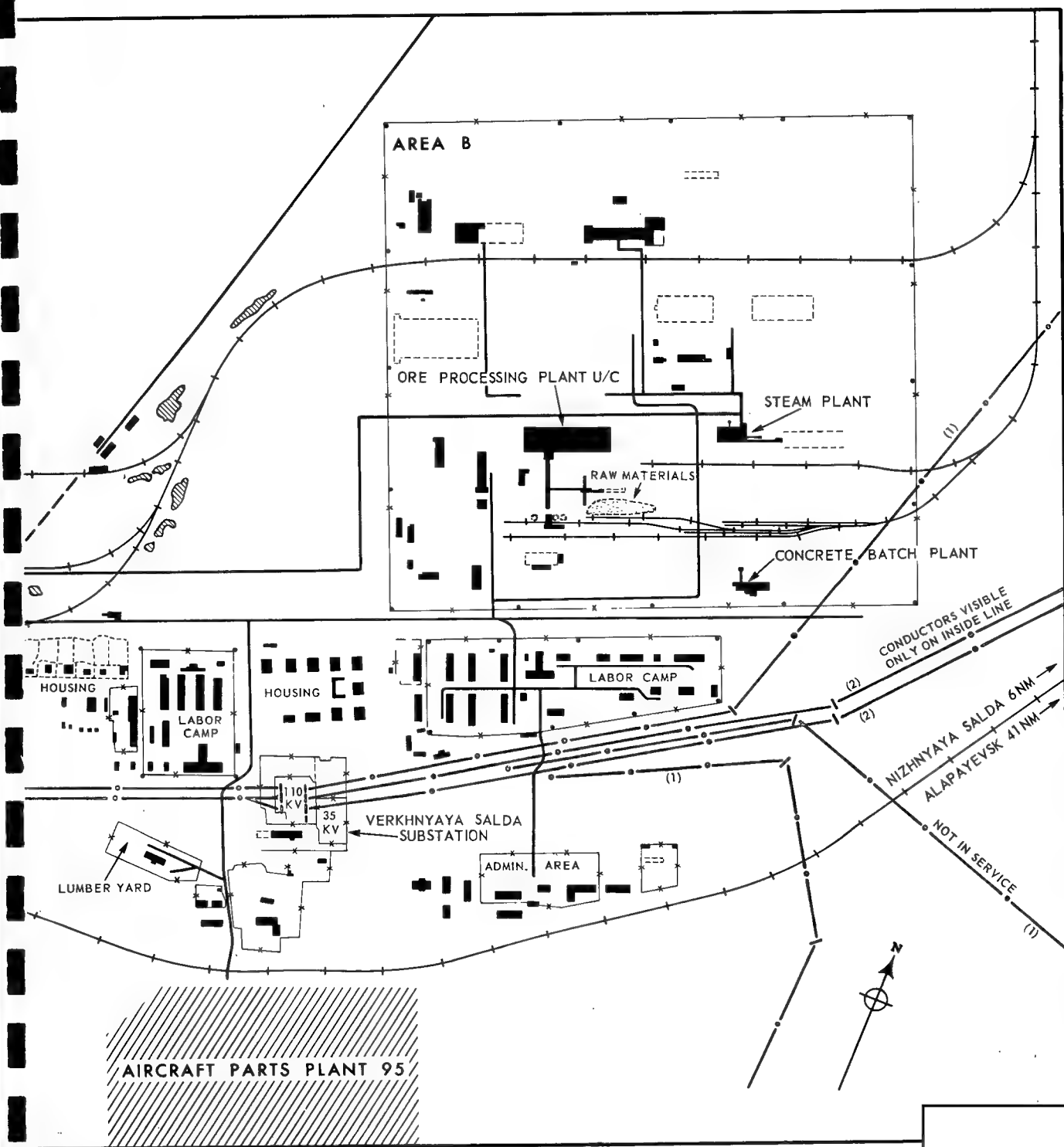


FIGURE 3. METALLURGICAL COMBINE AND RELATED FACILITIES. Rail spurs, an improved

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road, and a steam system u/c serve to connect the separately-fenced areas A and B.

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The probable 35-kv switching yard, which also contains seven switching positions, is located southeast of the 110-kv yard. It is questionable whether or not this unit is in service, although the equipment appears to be in place. No 35-kv powerlines are visible leaving the substation nor are supports for such lines visible in the immediate vicinity of the substation.

The two-storied control and low-voltage switching building is located between the 110-kv yard and the southern perimeter fence. It is probably in service. A lengthwise extension to the building is under construction, indicating an eventual increase in circuit capacity.

The three 110/35-kv transformers are located between the 110-kv and the 35-kv yards. The probable 110/10- or 6-kv transformer appears to be located between the 110-kv yard and the control and low-voltage switching building. Two excavations, one with foundations already in place, may be intended for two additional 110/10- or 6-kv transformers.

The perimeter fence is undergoing change so that it eventually will secure all of the substation's facilities.

There appear to be low-voltage power lines serving both areas A and B. In addition, electric power construction activity is evident immediately south of Area A.

Construction work for two possible small transformer substations is evident some 150 feet south of the main plant building in Area A. Each of these substations will probably contain one or two transformers and a low-voltage switching building. Two possible rectifier buildings, each approximately 105 feet by 30 feet, are attached to the south side of the main plant building, in a direct north-south line with the possible transformer substations under construction.

Along the Nizhniy Tagil-Verkhnyaya Salda power line, just to the south of the two possible substations under construction, there are two anchor towers with their crossarms set at a 45-degree angle to the power line (see Figure 3). This indicates that two lines will be installed to the pos-

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sible substations under construction from the northernmost 110-kv circuit. An intermediate single-circuit tower is already installed for each line. A jumper tie circuit is installed for the power line circuit between the two angle towers. Eventually, this jumper circuit may be replaced by one between the two possible substations under construction.

A single-circuit power line on wooden frame supports, possibly 110 kv, is visible between the main substation and Area A. However, it does not appear to be in service. It may be in the process of being installed or dismantled.

The status of the power lines leaving the Verkhnyaya Salda substation to the northeast cannot be determined. Changes have been made and new construction activity may be under way.

Five probable 110-kv power lines -- two double-circuit and three single-circuit -- are seen here. The two double-circuit lines are supported by Leningrad steel lattice towers which are close and parallel to each other. The 110-kv power conductors can be seen hanging from the inner arms of these towers. There is no evidence of conductors on the outer arms.

The three single-circuit lines are supported by wooden pi-portal frames and also are capable of supporting 110-kv conductors. Two of these three lines do not appear to be in service. No supporting towers were detected for 1,000 feet or more east of the Verkhnyaya Salda substation. Ground scars in this area indicate that the removal or installation of such towers is in progress.

It should be noted that the shortage of Soviet electric power equipment may account for the delay in the completion of facility construction apparent at this substation and its immediate vicinity.

REFINING AND FABRICATION FACILITY (AREA A)

The most striking feature of the metallurgical combine at Verkhnyaya Salda is found in Area A. This area, which measures approximately 2,850

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by 1,200 feet, is secured even from all of its support facilities (see Figure 4). While most of the perimeter fence appears to be of wire, a small portion in the southeast corner is a solid fence or wall. It is possible that the entire area will eventually be screened by a solid fence or wall. In addition, its perimeter is dotted with guard towers, and a ditch has been dug along the inside of the fence. The ditch is probably for drainage and/or security purposes.

This 78-acre area exists solely for one building, a huge, monitor-roofed structure measuring 1,500 by 425 feet and occupying almost 15 acres itself. The superstructure of the west half of this building is almost complete. Roof vents were being installed at the time of the photography. On the other hand the east half appears, for the most part, as a skeletal extension of the building, perhaps 35 percent complete.

Were it not for the presence of a tall, raised section, [] high, on the north side of the building, this would appear to be nothing more than an immense fabrication plant. But this raised section is 10 to 12 stories high (twice the height of the rest of the building), and several blocks long. This probably indicates that this section is designed for a process involving tall towers or a chain of refining or extracting processes operated from one floor to the next.

Another interesting feature of this plant is the square excavation (125 by 110 feet) visible below the east portion of the superstructure for the raised section. This is illustrated in a perspective drawing of the fabrication plant (Figure 5). The excavation appears to extend approximately [] below normal ground level. Among other things it could be suited for installation of a heat-treating furnace or a very large vertical press.

No stacks, towers, or storage tanks have been identified in Area A. Their absence may be due to the intermediate state of construction, except that any large stacks are usually started earlier.

There is considerable excavation work in progress in the northeast corner of Area A, possibly for future buildings. A ditch for a water line

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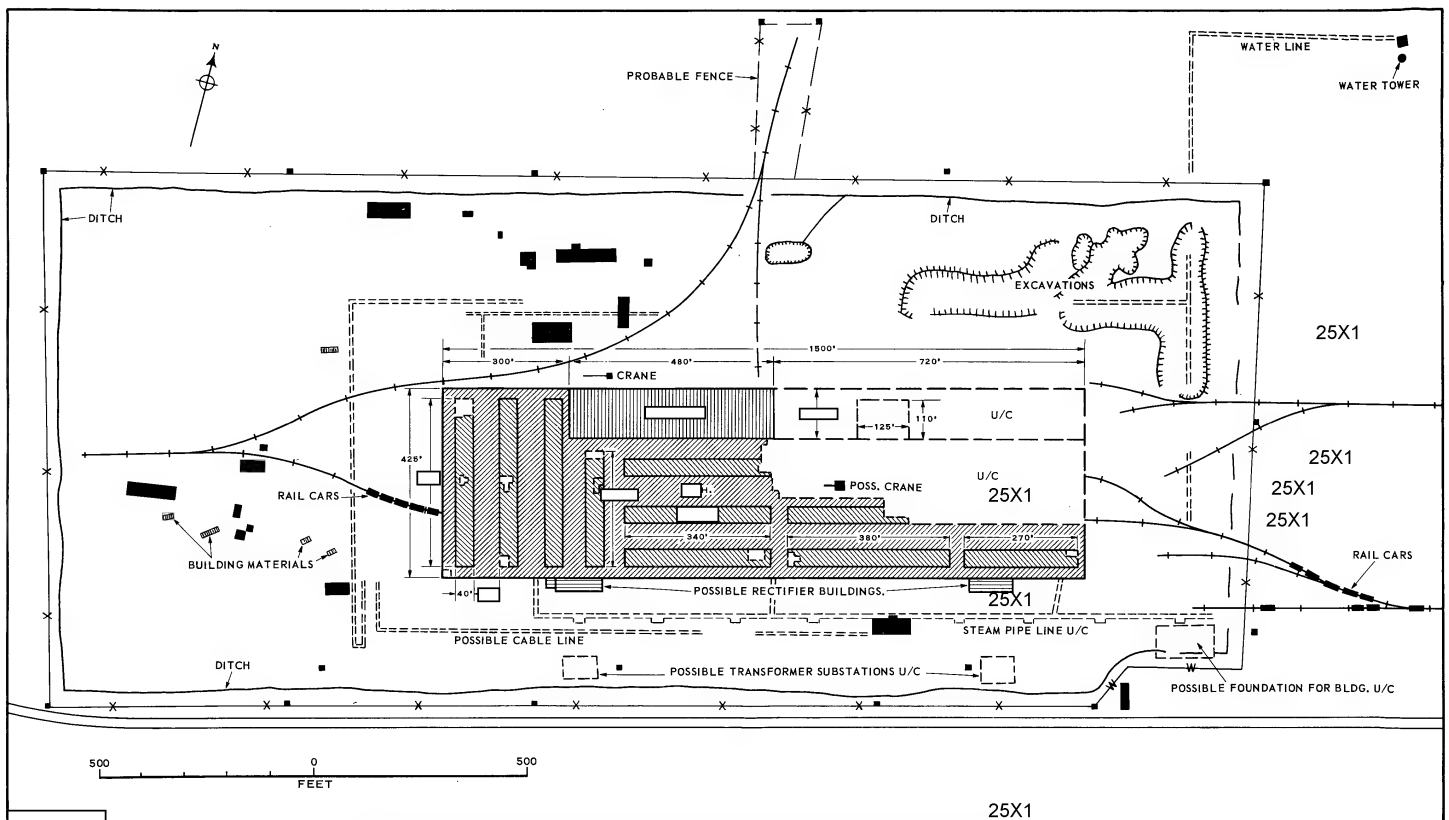


FIGURE 4. AREA A. Almost 15 of the 78 acres within the security fence are occupied by the huge fabrication plant.

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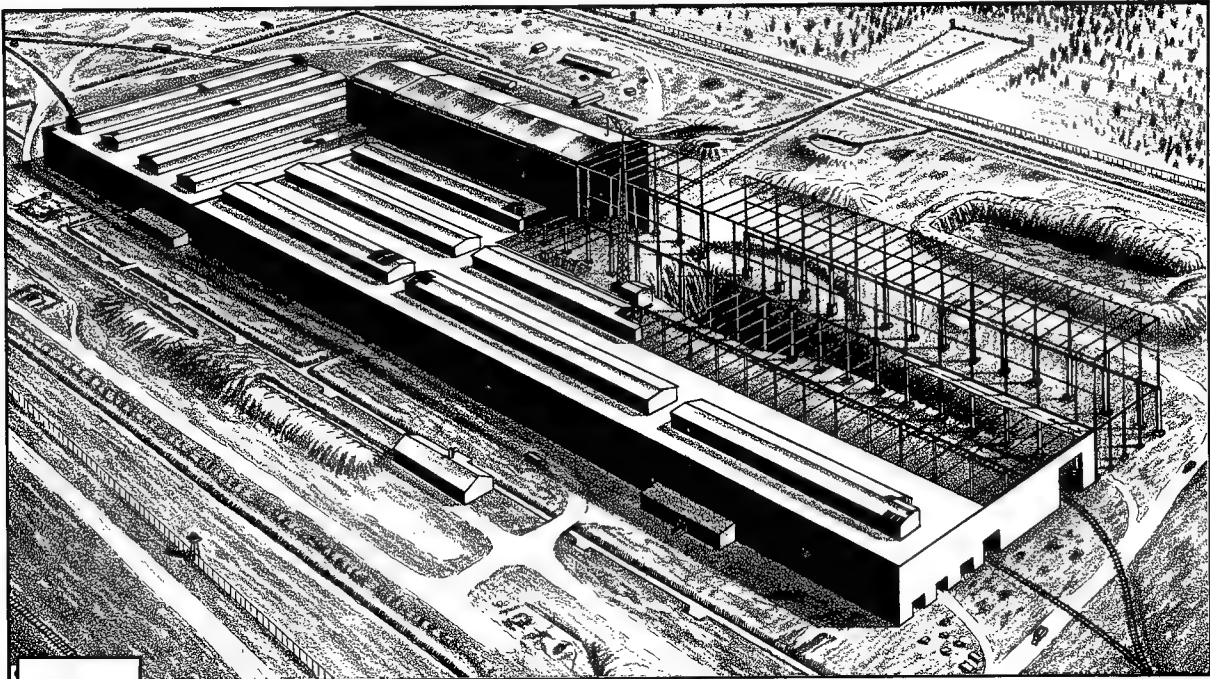


FIGURE 5. PERSPECTIVE VIEW OF FABRICATION PLANT. Of particular interest is the tall raised section where metal refining or extraction processes may be carried on.

extends from these excavations to a 10-foot diameter, []-high water tower approximately 450 feet northeast of the northeast corner of Area A.

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As mentioned in the detailed electric power analysis, two possible transformer yards with appropriate towers, rectifier buildings and cable lines appears to be under construction south of the plant building.

A steam pipeline under construction to the south of the fabrication plant is in alignment with the main steam line from Area B, but has not yet been connected to it.

Rail service in Area A is very peculiar. All traffic enters through several gates along the east fence. The two main spurs connecting areas A and B divide into additional spurs within Area A. One of these extends through the fabrication plant and joins with another spur north of the plant. This awkward network apparently is meant to allow trains to maneuver during construction operations.

In line with the requirement on this project, the plant in Area A was compared with several domestic zirconium plants. The immense size and

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height of the building do not appear to be consistent with known practices for producing zirconium in this country.

PROCESSING AND EXTRACTING FACILITIES (AREA B)

Area B is chiefly an area for the mechanical processing of ores and the extraction of metals from these ores. It is evident that the production flow goes from processing and extraction in Area B to refining and fabrication in Area A.

Area B also is enclosed by a security fence with guard towers, as illustrated in Figure 6. It is possible that this fence will become a solid fence by the time the area becomes operational. The area is almost square, 2,650 by 2,400 feet, and covers 146 acres. A ditch similar to the one in Area A is located along the inside of the perimeter fence.

Construction is evident throughout the area, with the stages ranging from mere foundations to nearly completed structures. The large ore-processing plant (Item 10) with its accompanying crusher and conveyers appears to be approximately 90 percent complete. A large pile of medium-toned material, probably ore, is located immediately south of the plant's conveyer system. A crane is unloading the material from hopper cars for stockpiling. A large overhead traveling crane is being assembled east of the processing plant.

Also to the east of this plant is a single-stack steam plant (Item 22) under construction. There is a fuel storage area to the east. A possible overhead traveling crane appears to be under construction here. A pipeline is under construction from the steam plant to Area A and also to individual facilities within Area B.

A concrete batch plant (Items 20, 21) located in the southeast sector of Area B appears to be completed or nearly completed.

In the northern half of Area B there are five large industrial-type buildings under construction. One of them (Item 32) is almost complete.

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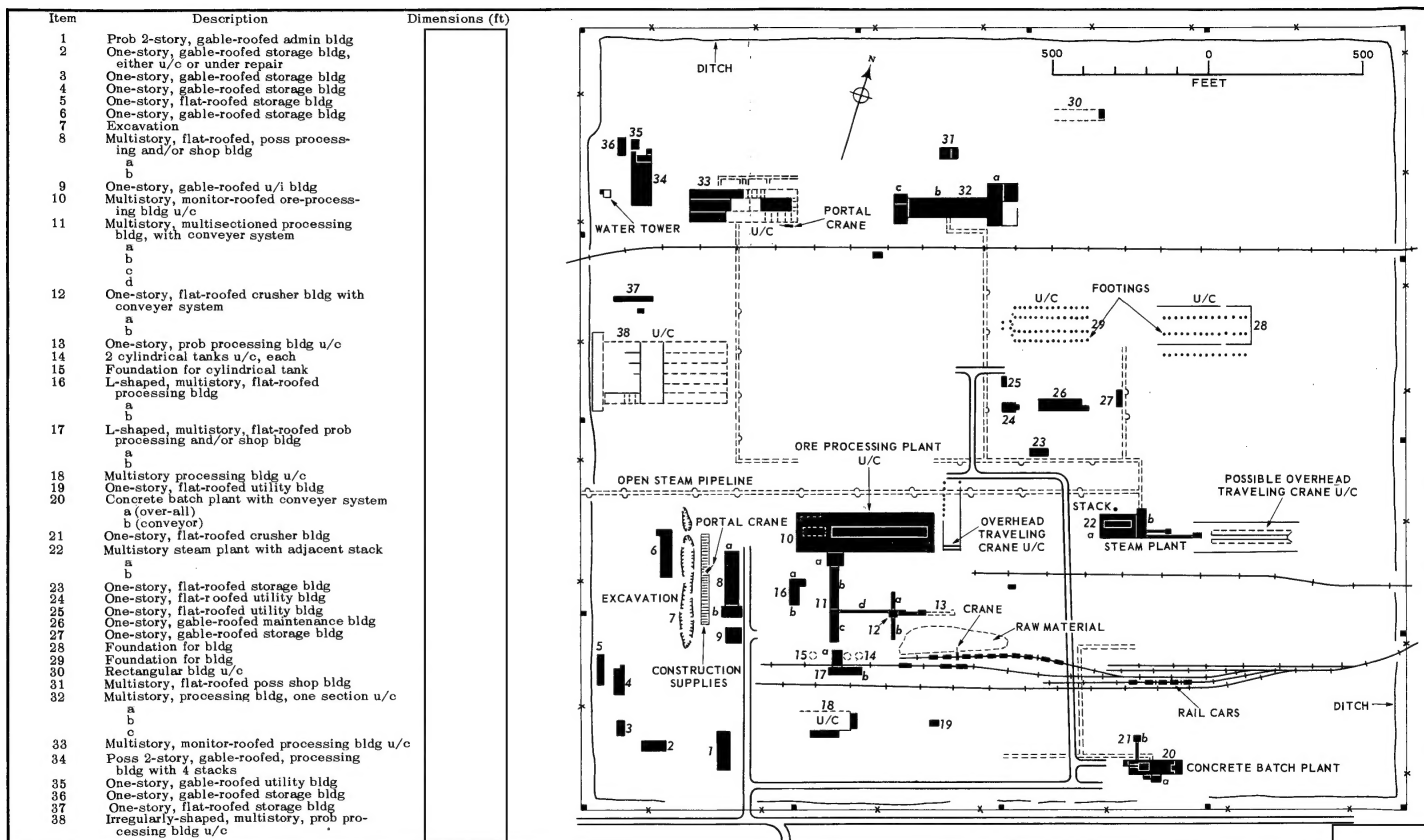


FIGURE 6. AREA B. This is chiefly a processing and support area for Area A. Items are keyed to the accompanying table.

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These buildings will probably serve as processing facilities to extract the metal from ore produced in building 10.

No electrical power facilities can be found under construction within the area, although a few low-voltage and/or telephone lines can be detected.

All building descriptions, dimensions, and possible functions are given in the table which accompanies Figure 6.

REFERENCES

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MAPS OR CHARTS

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